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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/068,400	02/06/2002	Shigetaka Kobayashi	JP920000346US1	9612

7590 04/29/2005

Arthur J. Samodovitz
IBM Corporation, Dept. IQ0A/Bldg. 40-3
1701 North Street
Endicott, NY 13760

EXAMINER	
HARAN, JOHN T	

ART UNIT	PAPER NUMBER
1733	

DATE MAILED: 04/29/2005

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/068,400
Filing Date: February 06, 2002
Appellant(s): KOBAYASHI ET AL.

Arthur Samodovitz
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 3/14/05.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection is substantially correct. The changes are as follows:

The new matter rejection of claims 25, 32, and 39 under 35 USC 112, first paragraph are hereby withdrawn in light of Appellants' arguments and need not be reviewed by the Board.

The objection of claim 39 as being a substantial duplicate of claim 25 was withdrawn in the action mailed on 9/24/04. It is noted that for future reference, objections are not appealable, but they are petitionable.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

Oxman et al.	U.S. Patent 6,395,124	May 28, 2002
Uchiyama et al.	U.S. Patent 5,847,796	Dec. 8, 1998

Oxman et al discloses a method for bonding a silicon IC chip to a printed circuit board made of FR4 (fiberglass reinforced epoxy resin) with a thermosetting adhesive wherein the printed circuit board is irradiated with near infrared energy and that energy passes through the printed circuit board to cure the adhesive (Column 9, lines 37-58 and Column 10, lines 33-34). Oxman et al does not explicitly state that the printed circuit board absorbs part of the near infrared energy and transmits the remainder to the adhesive, however it is inherent that the FR4 material does not have a 100% transmission rate of near infrared energy and that some part of the infrared energy will be absorbed by the FR4 substrate.

Uchiyama et al discloses a method of bonding an IC chip to the glass substrate of a liquid crystal device with a thermosetting anisotropic conductive film (ACF) or other thermosetting resin wherein the ACF is placed between the IC chip and the glass substrate and the ACF is cured to bond the IC chip and glass substrate together by

irradiating near infrared energy (electromagnetic waves) through the glass substrate to the ACF to heat and cure the ACF (Column 13, line 61 to Column 14, line 26). Uchiyama et al does not explicitly state that the glass substrate absorbs part of the near infrared energy and transmits the remainder to the ACF, however it is clear that glass does not have a 100% transmission rate of near infrared energy and that some part of the infrared energy will be absorbed by the glass. Uchiyama teaches pressing the chip against the substrate during a cooling step after heating has been stopped (Column 14, lines 20-27).

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 22, 29, and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Oxman et al (U.S. Patent 6,395,124).

Oxman et al discloses a method for bonding a silicon IC chip to a printed circuit board made of FR4 (fiberglass reinforced epoxy resin) with a thermosetting adhesive wherein the printed circuit board is irradiated with near infrared energy and that energy passes through the printed circuit board to cure the adhesive (Column 9, lines 37-58 and Column 10, lines 33-34). Oxman et al does not explicitly state that the printed circuit board absorbs part of the near infrared energy and transmits the remainder to the adhesive, however it is inherent that the FR4 material does not have a 100% transmission rate of near infrared energy and that some part of the infrared energy will be absorbed by the FR4 substrate. Oxman et al anticipates claim 22, 29, and 36.

It is noted that these claims (22, 29, and 36) are not appealed but the appealed claims depend from these claims so the rejection is stated for the convenience of all parties.

Claims 25, 32, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oxman et al (U.S. Patent 6,395,124) in view of Uchiyama et al (U.S. Patent 5,847,796).

Oxman et al is relied upon for the teachings noted above.

Regarding claims 25, 32, and 39, Oxman et al is silent towards applying pressure to the chip after the adhesive has been heated to a curing temperature and the irradiation stopped until the assembly has cooled to room temperature. It is well known and conventional to press a chip against a circuit board during a cooling step after heating has been stopped, as shown for example in Uchiyama et al (Column 5, lines 42-65 and Column 14, lines 20-27). It is noted that Uchiyama does not teach applying pressure until the assembly has cured to room temperature, but one skilled in the art would have readily appreciated maintaining the pressure as long as necessary in order to ensure proper adhesion and that such is a function of a variety of factors, such as the material worked upon, the curing properties of the adhesive, the thermal coefficients of expansion of the materials, etc. Furthermore, one skilled in the art would have readily appreciated that if it is only necessary to maintain pressure to a certain temperature during cooling in order to maintain adequate adhesion, there is no harm in continuing the pressure until the assembly is completely cooled even if doing so is unnecessary or

inefficient. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply pressure to the chip until the assembly has cooled to room temperature in order to ensure adequate adhesion in the method Oxman et al.

Claims 22-26, 28-33, 35-40, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchiyama et al (U.S. Patent 5,847,796) in view of the admitted prior art and Oxman et al (U.S. Patent 6,395,124).

Uchiyama et al discloses a method of bonding an IC chip to the glass substrate of a liquid crystal device with a thermosetting anisotropic conductive film (ACF) or other thermosetting resin wherein the ACF is placed between the IC chip and the glass substrate and the ACF is cured to bond the IC chip and glass substrate together by irradiating near infrared energy (electromagnetic waves) through the glass substrate to the ACF to heat and cure the ACF (Column 13, line 61 to Column 14, line 26). Uchiyama et al does not explicitly state that the glass substrate absorbs part of the near infrared energy and transmits the remainder to the ACF, however it is clear that glass does not have a 100% transmission rate of near infrared energy and that some part of the infrared energy will be absorbed by the glass.

Uchiyama et al is silent towards the substrate being fiberglass reinforced epoxy (FR4), however the admitted prior art teaches using a conventional glass substrate for the liquid crystal display, such as FR4, and that such conventional glass substrate is capable of use in the present application, i.e. the glass substrate absorbs part of the near infrared radiation and transmits part of it to the ACF (specification, page 8, lines 6-

16). Furthermore it is known in the prior art to bond an IC chip to a FR4 substrate by curing adhesive with near infrared radiation that is directed at the substrate which absorbs some and allows some to pass through and cure the adhesive, as taught in Oxman et al (Column 9, lines 37-58 and Column 10, lines 33-34). One skilled in the art would have readily appreciated using well known and conventional materials in the LCD art for the substrate, such as FR4 that partially transmits and partially absorbs near infrared energy, are usable in the process of Uchiyama et al. It would have been obvious to one of ordinary skill in the art at the time the invention was made to using a well known and conventional glass substrate, such as FR4, for the liquid crystal device in the method of Uchiyama et al that is capable of absorbing part of the near infrared radiation and transmitting part of it to the ACF, as suggested in the admitted prior art and Oxman et al.

Regarding claims 25, 32, and 39, Uchiyama teaches pressing the chip against the substrate during a cooling step after heating has been stopped (Column 5, lines 42-65 and Column 14, lines 20-27). It is noted that Uchiyama does not teach applying pressure until the assembly has cooled to room temperature, but one skilled in the art would have readily appreciated Uchiyama maintains the pressure as long as necessary in order to ensure proper adhesion and that such is a function of a variety of factors, such as the material worked upon, the curing properties of the adhesive, the thermal coefficients of expansion of the materials, etc. Furthermore, one skilled in the art would have readily appreciated that if it is only necessary to maintain pressure to a certain temperature during cooling in order to maintain adequate adhesion, there is no harm in

continuing the pressure until the assembly is completely cooled even if doing so is unnecessary or inefficient. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply pressure to the chip until the assembly has cooled to room temperature in order to ensure adequate adhesion in the method of Uchiyama et al, as modified above.

(10) Response to Argument

As noted above the new matter rejection of claims 25, 32, and 39 is withdrawn and the objection of claim 39 for being a substantial duplicate of claim 25 was previously withdrawn.

Appellants appeal only dependent claims 25, 32 and 39 and not the corresponding independent claims 22, 29, and 36. Appellants are considered to have acquiesced to the rejection of independent claims 22, 29, and 36.

The only issue is whether the art of record suggests the limitation of "halting the irradiating step after said adhesive is heated to a predetermined, curing temperature, and after the halting step, cooling said assembly to substantially room temperature and applying pressure on said IC chip toward said substrate during substantially the entirety of said cooling step".

It is noted that **it appears that the inventive aspect of the application is that the cooling of the assembly is a complex process wherein "subheat" and pressure are simultaneously applied to the IC chip during the entirety of the cooling down process to room temperature. However, such is not claimed as**

there is no requirement for subheating the IC chip during the entirety of the cooling process, and there is sufficient motivation to combine and modify the art of record to apply pressure during the entirety of the cooling down process to room temperature.

Oxman et al in view of Uchiyama et al

Oxman et al is silent towards applying pressure to the chip after the adhesive has been heated to a curing temperature and the irradiation stopped until the assembly has cooled to room temperature. It is well known and conventional to press a chip against a circuit board during a cooling step after heating has been stopped, as shown for example in Uchiyama et al (Column 5, lines 42-65 and Column 14, lines 20-27). It is noted that Uchiyama does not teach applying pressure until the assembly has cured to room temperature, but one skilled in the art would have readily appreciated maintaining the pressure as long as necessary in order to ensure proper adhesion and that such is a function of a variety of factors, such as the material worked upon, the curing properties of the adhesive, the thermal coefficients of expansion of the materials, etc. Furthermore, one skilled in the art would have readily appreciated that if it is only necessary to maintain pressure to a certain temperature during cooling in order to maintain adequate adhesion, there is no harm in continuing the pressure until the assembly is completely cooled even if doing so is unnecessary or inefficient.

Appellants argue impermissible hindsight. However, one skilled in the art would have readily appreciated that Uchiyama et al is directed to ensuring proper adhesion

and improving adhesive force using the "hot-cold effect" of applying pressure during heating of the adhesive, then maintaining the pressure for a portion of the cool down to room temperature after halting the heating (Column 5, lines 58-65). This is adequate support for the assertion that one skilled in the art would have readily appreciated maintaining the pressure as long as necessary in order to ensure proper adhesion.

In addition, Uchiyama et al discusses that the material worked upon and curing properties of the adhesive factor into the determination as the correlation of the adhesive's viscosity to temperature is relevant to ensuring and improving adhesion (Column 5, lines 42-47). This is adequate support for the assertion that the necessary pressure to ensure adequate adhesion depends on a variety of factors.

Furthermore, one skilled in the art would have readily appreciated that Uchiyama et al determined it is only necessary to maintain pressure until the assembly is cooled to 150 degrees Celsius in order to ensure adequate adhesion, however there is no harm in continuing the pressure until the assembly is completely cooled even if doing so is unnecessary or inefficient. There is adequate motivation to press the assembly, after the irradiation is halted, during the entirety of the cooling down period to room temperature.

It is again noted, that there is more to Appellants' invention than is being claimed, however the rejection of record meets the current claim language.

Uchiyama et al in view of The Admitted Prior Art and Oxman et al

Uchiyama teaches pressing the chip against the substrate during a cooling step after heating has been stopped (Column 5, lines 42-65 and Column 14, lines 20-27). It is noted that Uchiyama does not teach applying pressure until the assembly has cooled to room temperature, but one skilled in the art would have readily appreciated Uchiyama maintains the pressure as long as necessary in order to ensure proper adhesion and that such is a function of a variety of factors, such as the material worked upon, the curing properties of the adhesive, the thermal coefficients of expansion of the materials, etc. Furthermore, one skilled in the art would have readily appreciated that if it is only necessary to maintain pressure to a certain temperature during cooling in order to maintain adequate adhesion, there is no harm in continuing the pressure until the assembly is completely cooled even if doing so is unnecessary or inefficient.

Appellants' arguments are the same as for the rejection of Oxman et al in view of Uchiyama et al and the response is the same as that discussed above with respect to that rejection.

Conclusion

There is sufficient motivation to combine and modify the art of record to apply pressure during the entirety of the cooling down process to room temperature.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

John T. Haran

Conferees:

Blaine Copenheaver

Steven Griffin